Deterministic Finite Automata – Lecture 2 James Marshall

A DFA to recognise binary numbers divisible by 2 (from last lecture):



Design a DFA to recognise binary numbers divisible by 3:

How would we work out if a number is divisible by 3?

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Regular Operations

Definition

If *A* and *B* are languages then the regular operations *union*, *concatenation*, *star* and *complement* are defined as

- Union:
- Concatenation:
- Star:
- Complement:

Examples

Theorem

The class of regular languages is *closed* under the regular operations

Theorem

The class of regular languages is closed under the union operation

Proof Sketch (by construction)

$$\begin{split} M_1 &= (Q_1, \sum, \delta_1, q_1, F_1) \text{ recognises } A_1 \\ M_2 &= (Q_2, \sum, \delta_2, q_2, F_2) \text{ recognises } A_2 \end{split}$$

Design $M = (Q, \sum, \delta, q_0, F)$ that recognises $A_1 \cup A_2$